Amendments to the specification, with paragraph numbers according to those in application as published:

[0031] ~~Sheet~~ Fig. 1--External front view

[0032] ~~Sheet~~ Fig. 2--External view looking air intake side

[0033] ~~Sheet~~ Fig. 3--Cooling air inlet side view

[0034] ~~Sheet~~ Fig. 4--Top view

[0036] ~~Sheet~~ Fig. 5--Axial case section

[0037] ~~Sheet~~ Fig. 6--Axial crosswise case section--looking distribution side

[0038] ~~Sheet~~ Fig. 7--Axial crosswise case section--looking supercharger side

[0039] ~~Sheet~~ Fig. 8--Case crosswise section--supercharger position

[0041] ~~Sheet~~ Fig. 9 Case--upper flange A

[0042] ~~Sheet~~ Fig. 10 Case--axial flange B

[0043] ~~Sheet~~ Fig. 11 Case--oil sump flange C

[0045] ~~Sheet~~ Fig. 12--Engine rotor axes supports

[0047] ~~Sheet~~ Fig. 13--Engine axial section

[0048] ~~Sheet~~ Fig. 14--Engine crosswise section

[0050] ~~Sheet~~ Fig. 15--Part n°1 of external rotor--three-dimensional views

[0051] ~~Sheet~~ Fig. 16--Part n°1 of external rotor--views

[0052] ~~Sheet~~ Fig. 17--Part n°1 of external rotor--axial section A-A and crosswise section E-E

[0053] ~~Sheet~~ Fig. 18--External rotor Part n°1 -section on intake valves

[0054] ~~Sheet~~ Fig. 19--External rotor Part n°1 -section on exhaust valves

[0055] ~~Sheet~~ Fig. 20--External rotor Part n°1 -axial section on the nozzles

[0056] ~~Sheet~~ Fig. 21--External rotor Part n°2 -views of faces and axial section

[0057] ~~Sheet~~ Fig. 22--Valves distribution assembly

[0058] ~~Sheet~~ Fig. 23--Supercharger--views and sections

[0060] ~~Sheet~~ Fig. 24--Internal rotor and its shaft--exploded three dimensional view

[0061] ~~Sheet~~ Fig. 25--Internal rotor and its shaft--views and sections

[0062] ~~Sheet~~ Fig. 26--Injection pump camshaft

[0063] ~~Sheet~~ Fig. 27--"Planet" and "Satellite"--exploded view

[0064] ~~Sheet~~ Fig. 28--"Planet"--views

[0065] ~~Sheet~~ Fig. 29--"Planet"--sections

[0066] ~~Sheet~~ Fig. 30--"Satellite"--views and sections

[0067] ~~Sheet~~ Fig. 31--Engine rotors assembly exploded view

[0068] ~~Sheet~~ Fig. 32--Cooling air circulation system

[0069] The rotary engine of the present invention illustrated in the ~~above listed sheets of~~ drawings is an engine with a displacement of about 1500 c.c. with an overall dimension of about 560 cm along the axis, 480 cm in the direction crosswise the rotation axis and about 480 cm in the vertical direction (~~sheets n°~~ Figs. 1, 2, 3 and 4). The case comprises four elements bolted on three coupling flanges as shown on ~~sheets n°~~ Figs. 1, 2, 3, 5, 6 and 7. The shape of the flanges is shown on ~~sheets n°~~ Fig. 9 (Upper flange A), ~~sheets n°~~ Fig. 10 (Axial flange B) and sheet 11 (Flange C of the oil sump).

[0070] In the case two rotors one inside the other are moving, whose rotation axes are arranged on a plane inclined 15 degrees to the vertical (see ~~sheets n°~~ Fig. 14) and spaced 10 mm one from the other. The values of 15 degrees and the 10 mm of distance between the rotors may be varied as a function of the designed displacement of the engine and shape, orientation, and size of the nozzles and discharge valves described hereinafter.

[0071] As shown in the plane view of ~~sheets n°~~ Fig. 10 and vertical section of ~~sheets n°~~ Fig. 5, there are two boxes 47, 48 outside the engine. Looking the figure, one box 48 at the left end containing the rotor support 31 on the supercharger side and the rotor synchronization gear 51, the other box 47 at the right end containing the rotor support 20 at the timing system side.

[0072] The supports 20, 31 shown on ~~sheets n°~~ Fig. 12 will also act as main bearings both for the external and internal rotors. While the external rotor is keyed on the outer surface of the support, the axis of the internal rotor shown on ~~sheets n°~~ Fig. 25, rotates in the longitudinal hole made in both supports.

[0073] As above mentioned, the circumference of the outer surface of the supports and the longitudinal hole have the centers laying on a plane inclined of 15 degrees relative to the vertical line (views B and D of ~~sheets n°~~ Fig. 12) and the distance between said centers for this embodiment is 10 mm as already mentioned.

[0074] On the timing system side support toothings are made with helical teeth constituting the two fixed gears through which the camshafts for moving the intake and discharge valves (4 timing spindles 10 of ~~sheets n°~~ Fig. 22) and two camshafts 11 for the injection pump (~~sheets n°~~ Fig. 26) are driven.

[0076] The external rotor comprises two elements. The first element has the shape of a drum open at one side as shown in the perspective view of ~~sheets n°~~ Fig. 15 and in the illustration of the two faces of ~~sheets n°~~ Fig. 16, in addition to the axial sections A-A and the cross section E-E on ~~sheets n°~~ Fig. 17.

[0077] On the closed side of this first element there are eight holes through which the intake valves 14 and discharge valves 42 are installed, as well as the fins 3 of the blower for the forced circulation of cooling air. On the peripheral surface of the drum

one can see the outlets of the discharge nozzles 5 of the combustion gases and the rings of the seailing labyrinths 4. In the thickness of the drum body as shown in section E-E of ~~sheets n°~~ Fig. 17, the nozzles 5, the valves 41, 42, the spark plugs 55 and the cooling fins 7 are arranged. Two more wear resistant metal rings are arranged aside the combustion chambers. On said rings the compression rings of the planets and the satellites described later are rubbing.

[0078] The second element has the shape of a disk (~~sheets n°~~ Fig. 21) and is mounted on the open side of the first element after having assembled the internal rotor. On said second element the timing system (~~sheets n°~~ Fig. 22) and a set of blades (section A-A of ~~sheets n°~~ Fig. 21) are arranged, said blades having the function of forcing the internal circulation of cooling air in addition to a plurality of fins 23 removing heat from the area close to the combustion chambers.

[0079] On the first element the supercharger 2 is bolted, which is simply the group of intake manifolds 63 of the combusting air (~~sheets n°~~ Fig. 23) cast on a support disk. In view of the radial arrangement of the manifolds and their spiral shape, they will operate as a true supercharger. The external rotor is practically a rotary head and inside it the intake valves 41 (~~sheets n°~~ Fig. 18) and discharge valves 42 (~~sheets n°~~ Fig. 19) are arranged and shown also on ~~sheets n°~~ Fig. 14. Also on the external rotor one spark plug 55 for each combustion chamber is mounted (sheets n°14 and 17 section E-E). The sparking current will be conveyed to the spark plug through a stretch of circular bar arranged in the labyrinths and shown with numeral 43 on ~~sheets n°~~ Fig. 13.

[0081] The internal rotor is shown in the perspective view of ~~sheets n°~~ Fig. 24 together with its shaft and the separation elements of the crescent like combustion chambers (planet, satellite, planet guide and thrust spring). The faces of the rotor and the axial and cross sections can be seen on ~~sheets n°~~ Fig. 25. The separation elements of the

chambers, namely the planets 38 and satellites 39, are shown in detailed in the exploded view of sheet 27 and views and sections of sheets 28, 29 and 30.

[0083] The planet is reciprocating on two guide sleeves 37 (see sections A-A and C-C of ~~sheets n°~~ Fig. 25) and a central spring 40 is pushing the planet outwards when the centrifugal force is absent at still engine, to keep the planet and satellite group always in contact with the external rotor.

[0084] The planet and the satellite are of vital importance for the operation of the engine. Indeed the satellite operating as a compression ring, in view of its shape and the centrifugal force, fits continuously on the inner surface of the external rotor rubbing on it without loosing contact with the planet, rotating in its housing around the axis ~~X~~ M (~~sheets n°~~ Fig. 30). The satellite is held in its position by a key (~~sheets n°~~ Figs. 27 and 29) leaving it free to oscillate only around the axis ~~X~~ M.

[0085] In the internal rotor the injectors 60 (sections B-B and D-D of ~~sheets n°~~ Fig. 25) and the elements of the injection pump 62 (view B of ~~sheets n°~~ Fig. 25) are arranged, said pump being actuated by two camshafts 10, 11 (~~sheets n°~~ Fig. 26) driven by the toothing 53, 54 of the rotor support 20 on the timing system side (~~sheets n°~~ Fig. 12). ~~sheets n°~~ Fig. 31 is an exploded perspective assembly view of the two rotors and of the elements connected thereto.

[0087] As mentioned hereinbefore, the two rotors mechanically coupled through the synchronizing gear arranged in the support box of the supercharger side (~~sheets n°~~ Fig. 5, section C-C of ~~sheets n°~~ Fig. 6 and ~~sheets n°~~ Fig. 10), are rotating synchronized and in the same direction.

[0088] The motion of the satellite on the inner surface of the external rotor is now described during an entire revolution of the engine starting from point X

corresponding to the top dead center (~~sheets n°~~ Fig. 14). In this position the axes of the two rotors and the axis of oscillation of the satellite are on the same plane and therefore the satellite is perfectly aligned with the planet.

[0096] ~~sheets n°~~ Fig. 14 is a cross sectional view of the engine looking at the supercharger, the rotation direction in this section is clockwise and at the center one can see the internal rotor (see also ~~sheets n°~~ Figs. 24, 25), at its periphery the external rotor (see also ~~sheets n°~~ Figs. 15, 16, 17) and around the external rotor the case (see also ~~sheets n°~~ Figs. 6, 7, 8 and 5 besides ~~sheets n°~~ Figs. 9, 10 and 11 for the flanges). The travel of one of the combustion chambers will now be described for instance starting from position A where the chamber will be shortly after starting the revolution having just passed the top dead center. The volume of the chamber is at minimum, its intake valve 41 and discharge valve 42 are both closed and the mixture just ignited and exploded is expanding generating a tangential thrust on the planet at position Y while the pressure on the opposite planet at position X is still null because the planet is fully retracted in its housing.

[0098] At this latter position, while the gas thrust on the planet now reaching a position close to J is finishing, the gases go out violently through the discharge valve 42 following a parabolic path obliged by the inner shape of the valve surface (see also section E-E of ~~sheets n°~~ Fig. 17) thus generating on said surface a tangential thrust in the same direction of rotor rotation as it happens on a turbine blade.

[0107] In view of its construction, the rotary engine will always operate in a supercharged way because air sucked by manifold 1 (~~sheets n°~~ Fig. 13) enters the engine around the axis of the external rotor and by centrifugal force is compressed on the intake valve (see numeral 2 on ~~sheets n°~~ Fig. 13 and the supercharger on ~~sheets n°~~ Figs. 23 and 31).

[0109] The axis of rotation of the intake and discharge valves is parallel to the rotor axis (~~sheets n°~~ Figs. 18 and 19) and their motion will not cause sensible unbalance on the rotors.

[0110] The intake valve (~~sheets n°~~ Fig. 18) has an open bottom and is practically a hollow frustum cone with a longitudinal slot having width and length equal to the discharge port of the chamber. The discharge valve (~~sheets n°~~ Fig. 19) has a closed bottom and in the portion in contact with the discharge port of the chamber has a longitudinal cavity with parabolic section.

[0111] The valves are actuated as a pair by a camshaft (that can be seen in detail on ~~sheets n°~~ Fig. 22) and three cams are acting on each valve, the central cam moving the valve in an axial direction to detach it from the contact and sealing surface of the rotor intake or discharge port (because of its frustum conical shape), while the couple of side cams acts an instant thereafter on the valve actuating member that with its movement will cause the valve to rotate to the open or closed position as said valve is no more stuck but free to rotate.

[0114] In view of the higher efficiency of this engine, the total heat to be dissipated during its operation will be lower than what necessary with the present reciprocating engines, and therefore an inner forced circulation (~~sheets n°~~ Fig. 32) of air and the oil of the lubricating system as well as an outer forced circulation to the radiator will be sufficient to keep the temperature at acceptable values.

[0115] The cool oil coming back from the radiator will also take out heat from the lubricated hot points of the engine. The fins cast in the body of the external rotor (numeral 3 of ~~sheets n°~~ Fig. 13, ~~sheets n°~~ Figs. 16, 17 and 32) forced air circulation inside the engine and to the radiator pushing the air out of the engine through the outlet U to recycle it through inlet E (~~sheets n°~~ Figs. 1, 2, 3 and 4). The inner

circulation of air is free, while the outer circulation to the radiator is controlled by the engine thermostat.

[0118] In order to cause these forces to work to the advantage of driving stability, this engine will be installed on the vehicle with the rotor axis in a position crosswise the traveling direction (see ~~sheets nº~~ Fig. 4) and the direction of rotation of the rotors will be only and exclusively that shown on ~~sheets nº~~ Fig. 14.